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14 NOV 2000

The Patent Office

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1. Your reference PMM1934

2. Patent application number
(The Patent Office will fill in this part)

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P01/7700 0.00-0027750.9

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Trisport Limited
Amber Close
Tamworth Business Park
Amington, Tamworth
Staffordshire B77 4RP

Patents ADP number (if you know it) 4138467001

If the applicant is a corporate body, give the country/state of its incorporation

England

4. Title of the invention Studded Footwear

5. Name of your agent (if you have one)

Barker Brettell

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

138 Hagley Road
Edgbaston
Birmingham
B16 9PW

Patents ADP number (if you know it)

7442494002 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of Filing
(day/month/year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day/month/year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request (Answer 'Yes' if:

YES

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

Patents Form 1/77

Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document
Continuation sheets of this form

Description 12 + 12

Claim(s)

Abstract

Drawing(s) 3 + 3

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination
(*Patents Form 9/77*)

Request for substantive examination
(*Patents Form 10/77*)

Any other documents
(please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

Barker Brettell

Barker Brettell

Date

13/11/00

12. Name and daytime telephone number of person to contact in the United Kingdom

Miss Priscilla M. Makovski

TEL: 0121-456 1364

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Notes

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STUDDER FOOTWEAR

This invention relates to studded footwear such as sports shoes, for
5 example football boots and golf shoes.

The studs are intended to provide traction, having a ground-engaging part
of a type suited to the sport involved. Thus, studs for football tend to
have relatively sharp ground-piercing spikes, while those for golf shoes
10 currently have several relatively soft and blunt ground-gripping spikes.
The studs are detachably fastened to the sole of the article of footwear, by
a screw-threaded spigot on the stud engaging in a correspondingly
threaded socket in a receptacle moulded in, or otherwise secured to, the
shoe sole.

15 The screw-threaded connection must be designed to ensure that the stud
remains in place, even when high forces are applied, and in particular that
it does not unscrew accidentally. Known studs have either a single start
thread or a multi-start thread. A single start thread is the simplest thread
20 form, and provides a greater resistance to unscrewing than a multi-start
thread. It also provides a strong connection over the several turns of the
thread on the spigot and socket. However, because of the number of turns
needed to attach and detach the stud, removal and replacement becomes a
time-consuming operation. A multi-start thread has a steeper helix angle,
25 which enables a spigot of any given length to be inserted into the socket
with less rotation. Also, because a multi-start thread is deeper cut than a
single start thread, the shear strength of the thread is greater, so that a
shorter spigot can be used.

Whether a single start or multi-start thread is used, the studs and sockets also incorporate a locking ratchet to prevent accidental unscrewing of the studs. Typically, the stud and socket each have a set of teeth, which interengage as the stud is inserted into the socket. The arrangement of the teeth allows the stud to be in any one of a number of positions relative to the socket when it is fully inserted.

The screw threads and locking ratchets described are quite adequate where the rotational orientation of the stud relative to the sole is not significant. In fact, currently most studs are circular or otherwise rotationally symmetrical, and their final orientation relative to the shoe sole is not relevant.

However, in some sports where the forces on the studs are relatively high and of a particular type, such as lateral forces or forces due to rapid forward acceleration of the wearer of the shoe, studs which are specifically oriented can be more effective. (The term "specifically-oriented stud" will be used to include studs which are non-rotationally symmetrical, or studs which are rotationally symmetrical, but whose orientation relative to the shoe sole is significant.) A specifically-oriented stud must be oriented very precisely relative to the shoe sole to ensure that it operates in the desired manner. The known screw-threads and locking ratchets are unable to provide this precise orientation. For example, although a single start thread orients the stud at the start of its insertion, the multiple turns and the locking ratchet mean that its final position cannot be predicted. A multi-start thread of course provides a plurality of starting positions, and the locking ratchet a plurality of end positions.

The invention aims to ensure that a stud can be oriented precisely relatively to its socket; orientation of the socket relative to the shoe sole is of course necessary, but does not form part of this invention.

- 5 According to the first aspect of the present invention, in a combination of a shoe stud and receptacle, the shoe stud includes a ground-engaging part and the two components are adapted to be secured together by a threaded connection comprising a screw-threaded spigot on one of the two components adapted to be inserted with rotation into a screw-threaded
10 socket on the other component, and a locking means of the components which is arranged to become interengaged at least when the spigot is fully inserted into the socket to resist unscrewing of the assembly, the threaded connection includes a helical key and complementary keyway to determine the initial position of the stud relative to the socket, the key being
15 provided on one of the two components and the keyway being provided on the other component, and the locking means is so constructed and arranged that it determines the final position of the stud relative to the socket.
- 20 Thus, the helical key and the keyway provide the initial orientation of the stud relative to the receptacle, and the locking means provides the final orientation. A stud can therefore be specifically oriented relative to the receptacle, and hence to the shoe sole.
- 25 The threaded connection may be a single start thread, but is preferably a multi-start thread, as this reduces the number of turns required to attach and detach the stud. Most preferably the thread is a six start thread. This enables the stud to be attached in half a turn, which makes removal and attachment easy, and also makes it easy to arrange the locking means.

Preferably then the key comprises a bridged thread on one of the components, and a removed thread on the other component. Thus, on the one component the space between the crests of two adjacent threads is filled in, and on the other component the thread between two adjacent
5 roots is removed. This provides the necessary initial orientation of the stud relative to the socket, while not affecting the strength of the threaded connection significantly.

Conveniently the key is provided on the receptacle and the keyway on the
10 stud. Alternatively the key could be on the stud and the keyway on the receptacle.

The locking means preferably comprises radially facing locking formations on the stud and receptacle operative to come into mutual
15 engagement when the spigot has been screwed into the socket to a predetermined axial position. One of the locking formations comprises at least one radial projection, while the other comprises at least a radially-facing lead-in ramp, recess and stop means. The projection rides over a
20 lead-in ramp before snapping into a recess, and then engages the stop means to prevent the stud from being screwed any further into the socket. The locking means allows the stud to be unscrewed on application of a predetermined torque by resilient yielding of the locking formations. This locking means has the advantage of providing an audible indication of
25 locking, as the projection makes a clicking sound as it snaps into the recess. This locking means also adds to the strength of the connection between the study and the receptacle. Preferably two locking formations are provided, but it would be possible to provide four or more.

Where the stud is attached in half a turn and two locking formations are
30 provided, the locking formations may be on different diameters. This

helps to provide a positive initial orientation of the stud, and ensures that no cross-threading can occur.

5 The projections are on different diameters, while the ramps, recesses and stop means are formed on the walls of annular channels of corresponding diameters.

10 Alternatively, the locking means may comprise locking formations as a ring of posts extending axially from one of the components and a ring of radially projecting teeth on the other component, arranged such that when the spigot has been screwed into the socket to a predetermined axial position, engagement of the teeth with the posts causes resilient deflection of the posts, and engagement of the teeth between the posts 'causes interengagement of the locking means.

15

With either type of locking means it is easy to arrange the locking formations circumferentially relative to the key and keyway to ensure the precise final orientation of the stud relative to the receptacle.

20 The method of orienting the stud relative to the receptacle may also form part of the invention. A second aspect of the invention relates specifically to a shoe stud.

25 According to a second aspect of the invention, a stud for use with an article of studded footwear having a receptacle with a multi-start screw-threaded socket, has a spigot with a multi-start screw thread complementary to the screw thread of the socket, such that rotary insertion of the spigot into the socket secures the stud in the socket, the spigot having one component of a helical key and complementary keyway,
30 of which the other component is provided on the receptacle, the helical

key and keyway defining the position of the spigot relative to the socket at the start of the insertion of the spigot into the socket.

5 Preferably the keyway is provided on the spigot, but it may instead have the key.

10 The stud may also include one component of a locking means, of which a complementary component is provided on the receptacle to receive the stud in the socket.

A third aspect of the invention relates to a receptacle for incorporation in an article of studded footwear, the receptacle being adapted to receive a stud.

15 According to a third aspect of the invention, a receptacle for incorporation in an article of studded footwear has a multi-start screw-threaded socket adapted to receive a spigot of a shoe stud, the spigot having a multi-start screw thread complementary to the screw thread of the socket, such that rotary insertion of the spigot into the socket secures
20 the stud in the socket, the receptacle having one component of a helical key and complementary keyway of which the other component is provided on the spigot, the helical key and keyway defining the position of the spigot relative to the socket at the start of the insertion of the spigot into the socket.

25 Preferably the key is provided on the receptacle, but it may instead have the keyway.

30 The receptacle may also have one component of a locking means, of which a complementary component is provided on the stud.

The various aspects of the invention are illustrated, by way of example only, in the accompanying drawings, in which:

5 **Figure 1** is an underneath plan view of a shoe stud;

Figure 2 is a top plan view of the stud of **Figure 1**;

10 **Figure 3** is a section along the line 3-3 of **Figure 1**;

Figure 4 is a section along the line 4-4 of **Figure 1**;

Figure 5 is an underneath plan view of a receptacle for the stud of **Figures 1 to 4**;

15 **Figure 6** is a section along the line 6-6 of **Figure 5**;

Figures 7 and 8 are similar to **Figures 2 and 3**, but show a modification; and

20 **Figures 9 and 10** are similar to **Figures 5 and 6**, but show a modified receptacle for the stud of **Figures 7 and 8**.

25 **Figures 1 to 4** show a stud 1 suitable for use on a sports shoe such as a football boot (not shown). The stud 1 is adapted to be inserted with rotation and received in a receptacle 2, shown in **Figures 5 and 6**, which is moulded into or otherwise attached to a sole or heel of the sports shoe.

30 The stud 1 is a unitary moulding of plastics material and has an elliptical flange 3. A ground-engaging spike 4 projects from the lower side of the

flange 3, while an externally screw-threaded spigot 5 projects from the upper side. Figure 1 shows the spike 4 to be of non-rotationally symmetrical form, being elongated along the major axis of the flange 3, rounded at one end 6, and tapering to a point at the other end 7. The spike 4 has a recess 8 at its ground-engaging end, and a plain cylindrical bore 9 extends from the recess 8 up through the spigot 5. It will be appreciated that the spike could be of any other non-rotationally symmetrical form, such as arrow-shaped. As the spike 4 is non-rotationally symmetrical, it requires to be oriented in use relative to the shoe sole. Orientation of the stud 1 in the receptacle is the first stage of this.

The external screw thread on the spigot 5 is a six-start thread, with a relatively steep helix angle, so that the stud 1 can be inserted in the receptacle 2 by half a turn. In order to define the initial position of the stud 1 relative to the receptacle 2, one of the threads 10 on the spigot 5 is removed to form a helical keyway 11 for a complementary key 12 formed on the screw-thread of the receptacle 2.

Because of the relatively steep helix angle of the thread, the frictional resistance to unscrewing of the stud 1 is relatively low. The stud 1 and receptacle 2 therefore have a locking means 13, which serves to secure the stud 1 in the receptacle 2, and to define its final position relative to the receptacle 2.

The stud 1 thus has a locking formation comprising a pair of diametrically opposed projections 14. Each projection 14 comprises a part-cylindrical web extending axially from a ring 15 which itself projects axially from the flange 3, radially spaced from the spigot 5. Each projection 14 has a radially-outwardly extending locking projection 16 as an axially extending

rib provided on the leading end (in the screwing-up direction) of the web. A leading side face 17 of the rib is rounded off to give a smooth convex corner profile joining a flat outer face 18 of the rib and a flat leading end face 19 of the web. A trailing side face 20 of the rib is flat and generally square with the outer face 18 and with a cylindrical outer surface of the web where it joins it. The trailing end of the web is angled, so that the circumferential dimension of the lower end of the web where it joins the ring 15 is less than the circumferential dimension at its upper end. The ring 15 is of stepped diameter, to provide two semi-circles of slightly different diameter, with one projection 14 projecting from each semi-circle such that the radial spacing of the two projections 14 from the spigot 5 is slightly different and their axial height is less than the axial height of the spigot 5. The axial height of the ring 15 is about half that of the spigot 5.

15

The receptacle 2 (see Figures 5 and 6) is also a unitary moulding of plastics material. It has a circular top plate 30 with a central boss 31 depending from it. An annular anchoring flange 32 is formed by a portion 33 of the plate 30 projecting radially outwards beyond the boss 31. The portion 33 has four arcuate holes 34 which assist in anchoring the flange 32 in the shoe sole or heel.

The boss 31 comprises a stout inner cylindrical wall 35 and a relatively thin and slightly flexible outer wall 36. The inner wall 35 forms an internally screw-threaded socket 37, adapted to receive the spigot 5. The socket 37 also has a six-start thread, with the key 12 formed by bridging between two adjacent threads (i.e. filling in between the crests of two adjacent threads, to be complementary to the keyway 11 formed on the stud 1 by removing a thread between two adjacent roots).

30

The radially outer surface 38 of the wall 35 and the radially inner surface 39 of the outer wall 36 are of stepped diameter, so that two part-annular spaces 40, 41 of different diameters are defined between them. The diameters of the spaces 40, 41 correspond to the diameters of the projections 14, so that each projection 14 can be received only in one annular space 40 or 41. The spaces 40, 41 are separated by a pair of diametrically opposed axial stops 42, which form part of the locking means.

The locking means on the receptacle is provided as two locking formations on the outer wall 36, formed on the inner surface 39 of that wall to face radially inwards. Each formation has a recess 44 bordered on one circumferential side by a lead-in ramp 45, and on the other side by the stop 42. The ramps 45 extend at most round an eighth of the circumference of the wall 36, and have an axial height of about one-third of the axial height of the walls 35, 36. This ensures that the locking means operates right at the end of the insertion of the spigot 5 into the socket 37.

In use the receptacle 2 is incorporated in the sole or heel of a sports shoe. Normally the receptacle 2 is moulded into the shoe sole or heel. Because the stud 1 needs to be specifically-oriented, the receptacle 2 must also be oriented precisely in the shoe sole or heel. The stepped outer wall 36 may be used to orient the receptacle 2 in a mould, or other orienting features (not shown) may be provided on the receptacle 2.

25

The stud 1 is installed by the insertion of the spigot 5 into the socket 37, with the projections 14 being received in the annular spaces 40, 41 at the same time. Because of the key 12 and keyway 11 there is only one position in which the threads on the spigot 5 and socket 37 can start to engage. Rotation of the stud 1 causes the spigot 5 to be drawn into the

30

socket 37, and the projections 14 into the annular spaces 40, 41. The shape of the threads is such that full insertion of the stud 1 takes only half a turn. For the last quarter of the insertion movement of the locking projections 16 engage with the lead-in ramps 45, and then snap into the recesses 44 between the ramps 45 and the stops 42. Further rotation is therefore prevented by the engagement of the projections 16 with the stops 42. The outer wall 36 deforms resiliently as the projections 16 ride over the ramps 45, but returns to its original shape when the projections reach the recesses 44. As the projections 16 snap into the recesses 44 they make an audible click, signalling that the insertion of the stud 1 is complete.

The initial position of the stud 1 relative to the receptacle 2 is determined by the key 12 and keyway 11, and to a lesser extent by the projections 14. The final position is determined by the locking means, thus ensuring that in the final position the stud 1 is precisely oriented relative to the receptacle 2.

Figures 7 to 10 show a modified stud 1 and receptacle 2, and corresponding reference numerals have been applied to corresponding parts. The main difference with the embodiment of Figures 7 to 10 is that the projections 14 on the stud 1 are on the same diameter, thus simplifying the construction. The projections 14 are of the same shape, as in the first embodiment, with similar locking projections 16.

The receptacle 2 is modified to suit the stud 1. In the receptacle 2 the radially outer surface 38 of the wall 35 and the radially inner surface 39 of the outer wall 36 are each now of a constant diameter, so that the part-annular spaces 50 are the same, being defined between the stops 42.

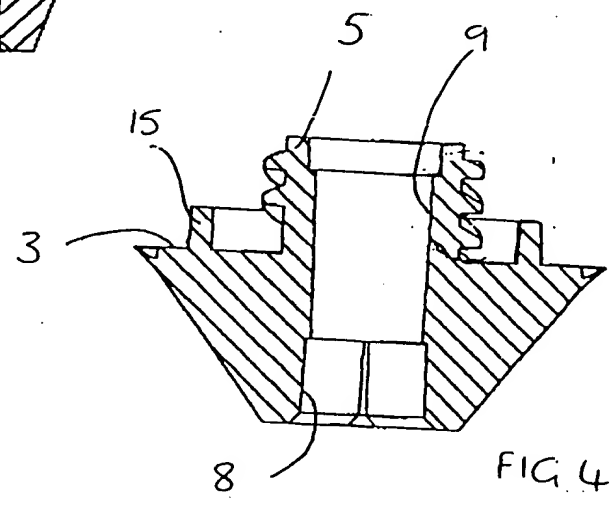
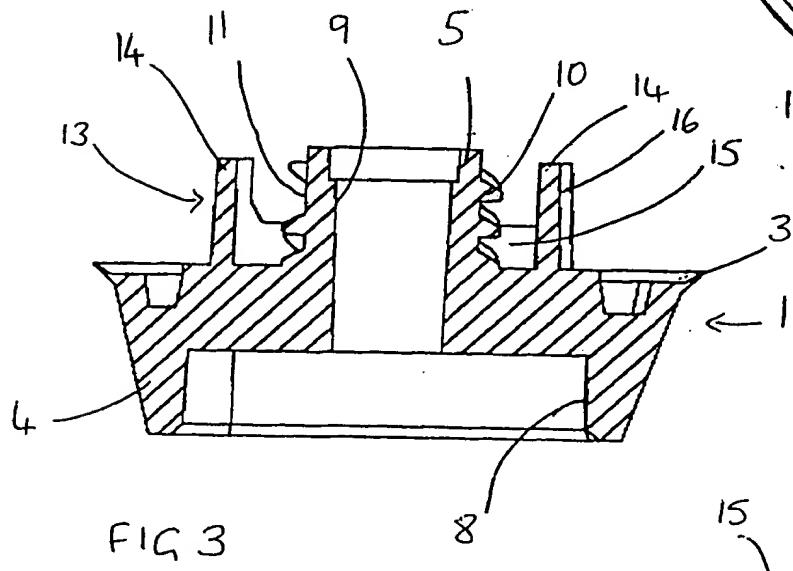
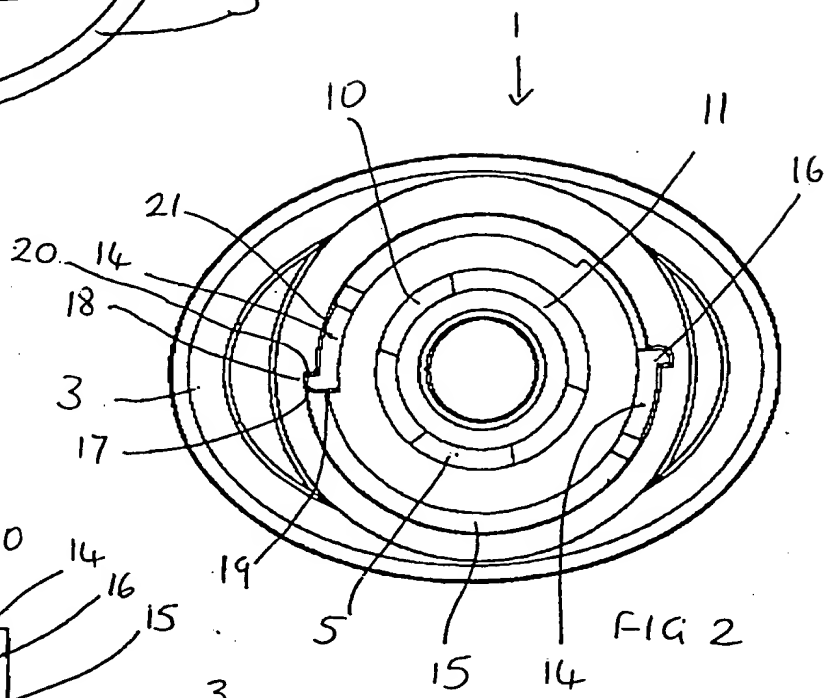
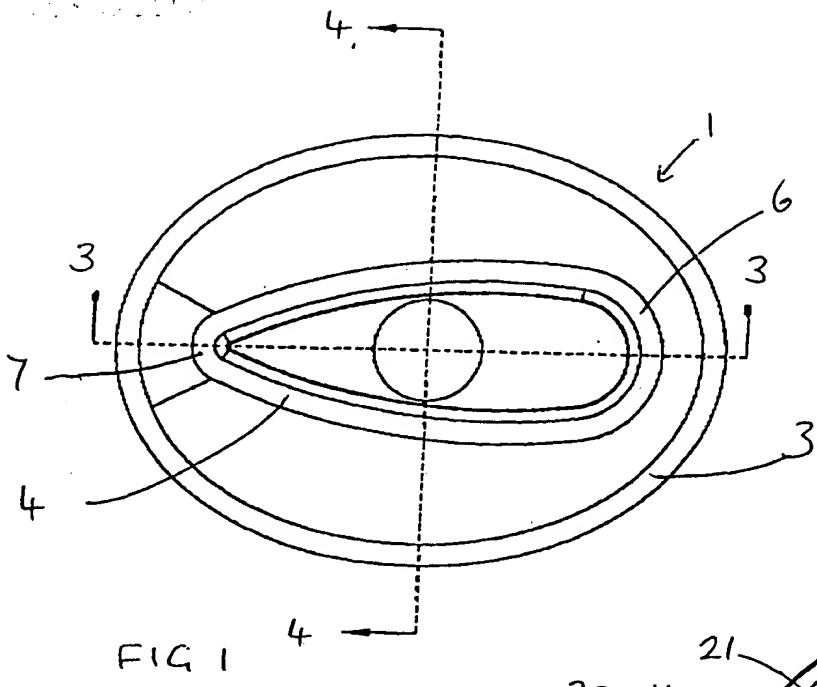
It will also be noted that the anchoring flange 32 is oval rather than circular, with the holes 34 being modified.

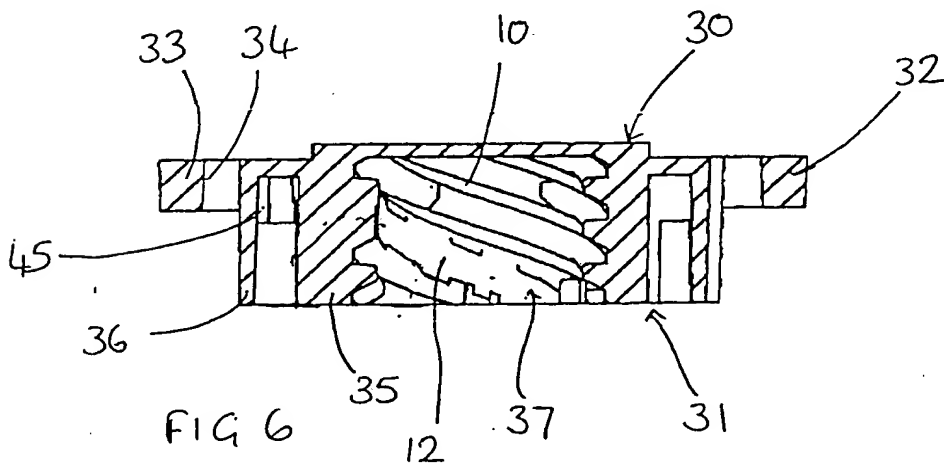
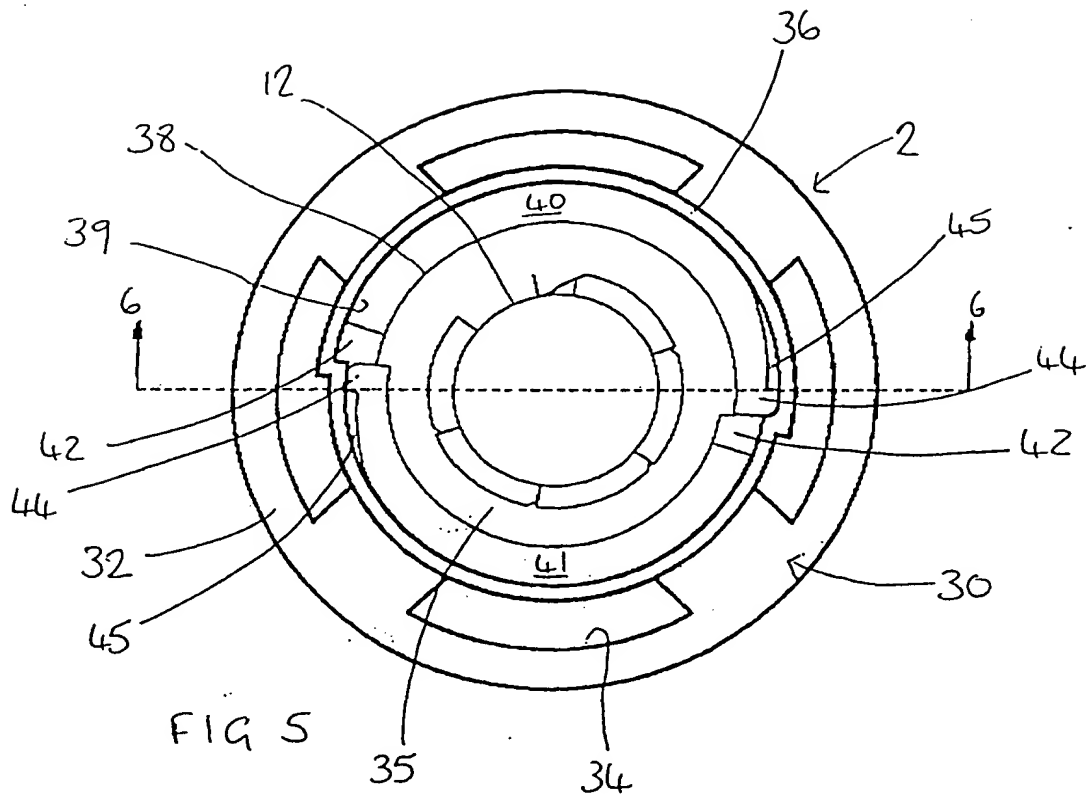
Otherwise, the construction and operation of the embodiment of Figures 7
5 to 10 is the same as that of Figures 1 to 6.

In a modification of either embodiment (not shown) the helical key 12 may be provided on the stud 1, and the keyway 11 on the receptacle 2.

10 In another modification (not shown) it would be possible to provide more than two locking formations for added security, as long as they only come into engagement at the end of insertion of the stud 1.

15 In a further modification (not shown) the locking means may comprise a ring of resilient posts on one component, usually the stud 1, co-operating with a ring of teeth on the other component. This may be preferred for golf shoe studs, where the locking means is not so critical, because the forces applied to the stud in use are in general less than those applied to football studs.





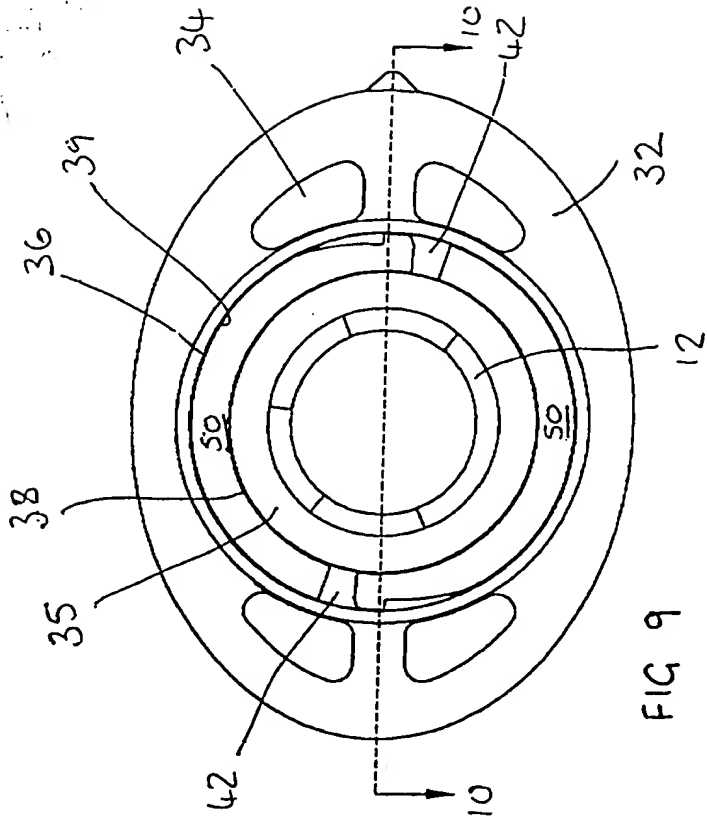


FIG 9

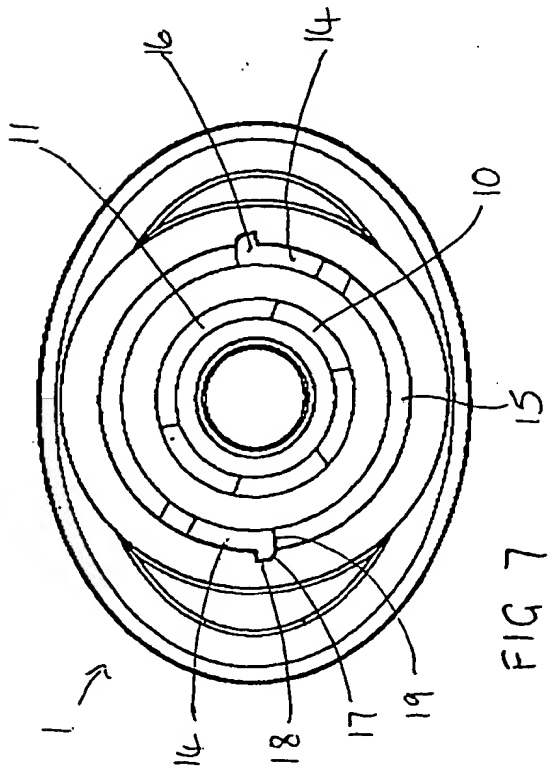


FIG 7

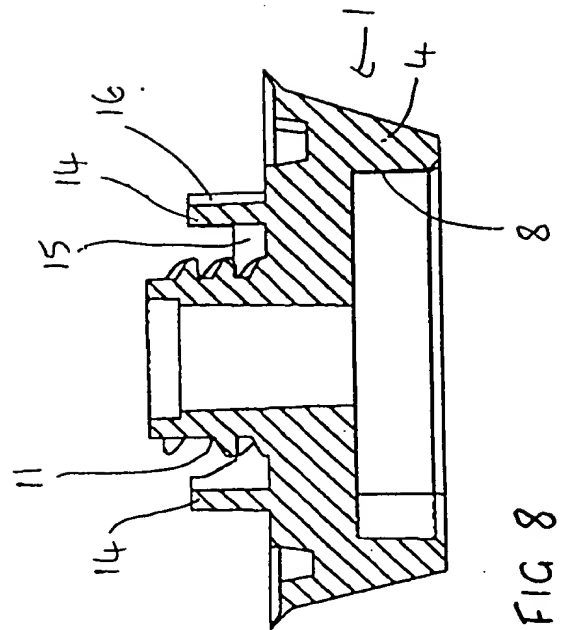


FIG 8

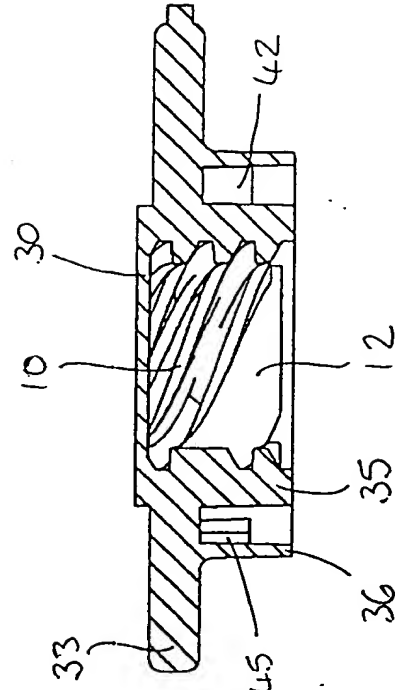


FIG 10